

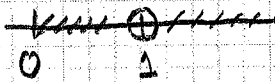
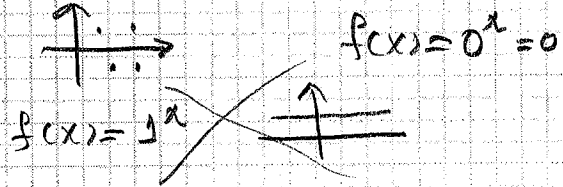
EXPONENTIAL FUNCTIONS

$f(x) = x^2$ is not exponential

$f(x) = 2^x$ is " "

$f(x) = b^x$

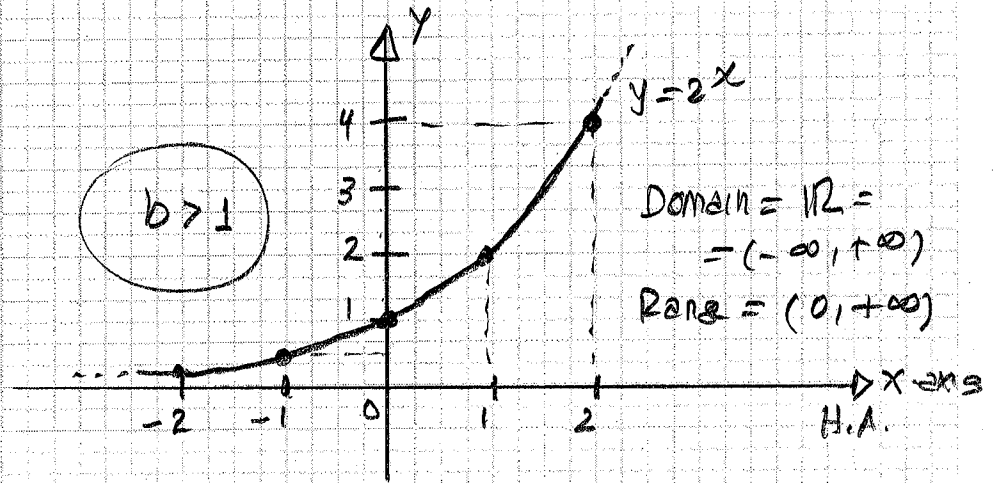
$b > 0$
 $b \neq 1$



Ex: $f(x) = 2^x$

x	2^x
-2	$2^{-2} = 1/4$
-1	$2^{-1} = 1/2$
0	$2^0 = 1$
1	$2^1 = 2$
2	$2^2 = 4$

$b > 1$



Rules of Exponents

$x^0 = 1$

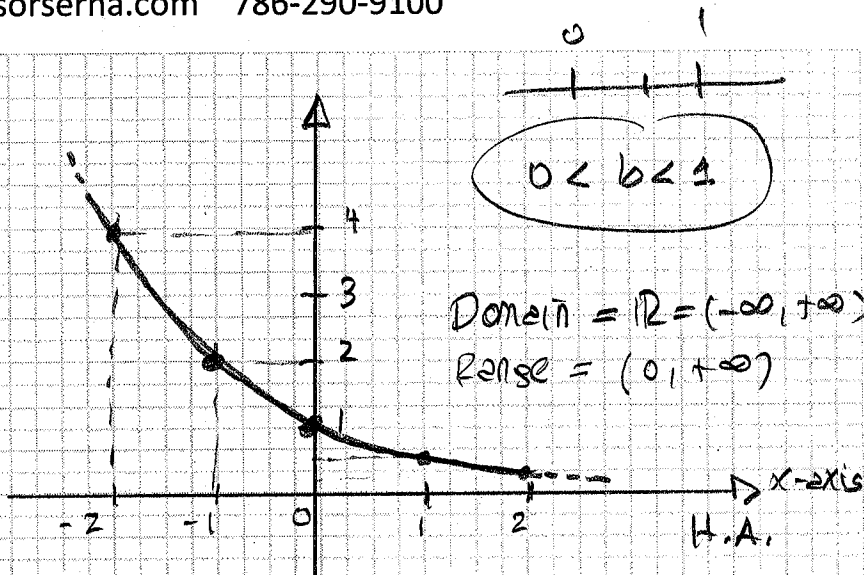
$x^{-n} = \frac{1}{x^n}$

$2^{-1} = \frac{1}{2^1} = 1/2$

$2^{-2} = \frac{1}{2^2} = 1/4$

Ex: $f(x) = \left(\frac{1}{2}\right)^x$

x	y
-2	4
-1	$\left(\frac{1}{2}\right)^{-1} = 2$
0	$\left(\frac{1}{2}\right)^0 = 1$
1	$\left(\frac{1}{2}\right)^1 = \frac{1}{2}$
2	$\left(\frac{1}{2}\right)^2 = \frac{1}{4}$



$x^0 = 1$

$\left(\frac{1}{2}\right)^2 = \frac{1^2}{2^2} = \frac{1}{4}$

$x^{-n} = \frac{1}{x^n}$

$\left(\frac{1}{2}\right)^{-1} = \frac{1}{\left(\frac{1}{2}\right)^1} = \frac{1}{\frac{1}{2}} = 1 \cdot \frac{2}{1} = 2$

$\left(\frac{1}{2}\right)^{-2} = \dots = 4$

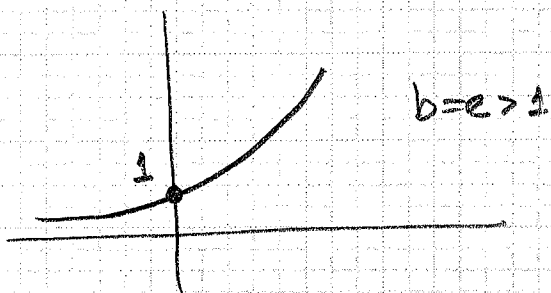
NOTE: $\left(\frac{1}{2}\right)^x = \frac{1}{2^x}$

$f(x) = \frac{1}{2^x} = \left(\frac{1}{2}\right)^x$

Ex: $f(x) = e^x$

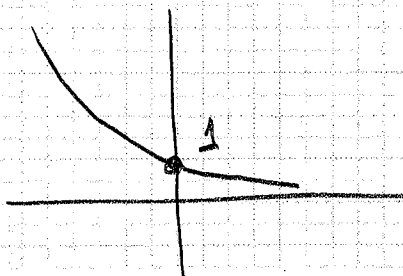
$e \approx 2.718... > 1$

$\left(1 + \frac{1}{n}\right)^n$ when $n \rightarrow +\infty$

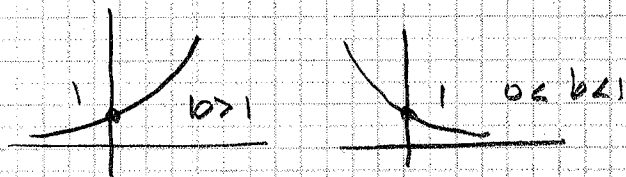


Ex: $f(x) = \frac{1}{e^x} = \left(\frac{1}{e}\right)^x$

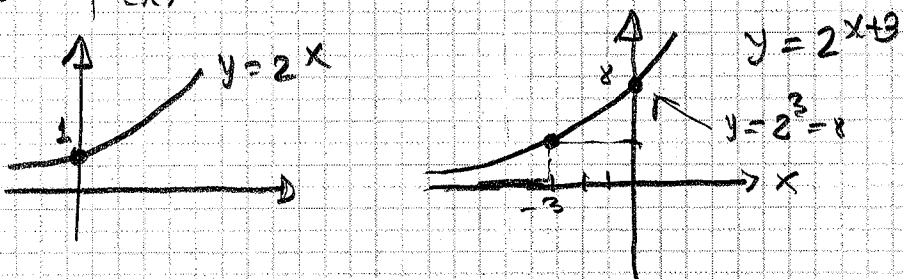
$0 < \frac{1}{e} \approx \frac{1}{2.718...} < 1$



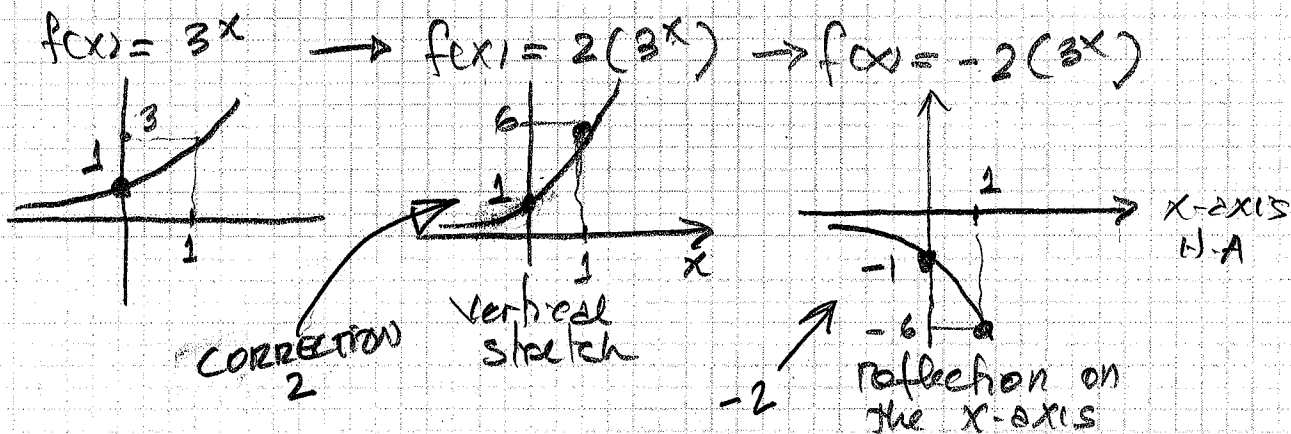
Transformations of Exponential Functions



ex: $f(x) = 2^{x+3}$ shift to the left $b=2 > 1$



ex: $f(x) = 1 - 2(3^x) = -2(3^x) + 1$



$f(x) = -2(3^x) + 1$

